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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

2
0. Southern Regional Research Laboratory,
2100 Robert E. Lee Boulevard
New Orleans, 19, Louisiana.,

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LIST OF PUBLICATIONS AND PATENTS*

Southern Region,

January - June 1951 X

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Patent Office, Washington, D. C.

SOUTHERN REGIONAL RESEARCH LABORATORY
2100 Robert E. Lee Boulevard
New Orleans, La.

ARTICLES AND ADDRESSES

No.

Apparatus and Machinery, Analytical Methods, and Techniques

- 1 ADAMS, Mabelle E., Karon, Melvin L., and Reeves, Richard E.

THE ELECTROPHORETIC MIGRATION OF CELLULOSE IN CUPRIETHYLENEDIAMINE SOLUTION. Amer. Chem. Soc. Jour. 73(5): 2350-2351. 1951.

By the substitution of copper plates for the silver-silver chloride electrodes, the Tiselius electrophoresis apparatus has been adapted to the observation of the migration of cellulose dissolved in cupriethylene-diamine solution. Cellulose migrates toward the anode, the ascending boundaries remaining sharp and unresolved while the descending boundaries separate into distinguishable peaks. The pattern of the descending boundaries appears to be characteristic of the dissolved cellulose.

- 2 BROWN, Lawrence E.

IMPROVED 5-MG. RIDER FOR AINSWORTH MICROCHEMICAL BALANCES. Analyt. Chem. 23(2): 388. 1951.

A 5-mg. rider for Ainsworth microchemical balances which has a low seating error, comparable to that of a 0.5 mg. rider, has been constructed from aluminum foil. Its essential feature is that it has a thin, straight bearing edge and can be brought to rest in the bottom of the notch of the balance beam with ease and without undue manipulation of the rider carrier. The construction of the rider is described and illustrated, and data on its performance in comparison with some wire riders are tabulated.

- 3 BUDOWSKI*, Pierre, O'Connor, R. T., and Field, E. T.

SESAME OIL. VI. DETERMINATION OF SESAMIN. Amer. Oil Chem. Soc. Jour. 28(2): 51-54. 1951.

A new method for the determination of sesamin in sesame oils is based on the measurement of the ultraviolet absorption of sesame oil following the

*Rockefeller Foundation fellow of the Ministerio de Agricultura y Cria, Division de Quimica, El Valle, D. F. Venezuela.

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removal of sesamol by treatment with alkali and correction for the absorption resulting from the presence of sesamolin. The advantages of the new method over the colorimetric method previously described by Jacobson, Acree, and Haller (Indus. Engin. Chem., Analyt. Ed. 16(3): 166-167 (1944)) are its greater simplicity, accuracy, and lack of hazards. The accuracy of the method is attested to by a comparison of the determined values with those for known added amounts of sesamin in cottonseed and sesame oils. When applied to four crude oils the content of sesamin was found to range from 0.50 to 0.96 percent. Ultraviolet absorption spectra curves are reported for sesamin, sesamolin, sesamol, and sesame oil.

- 4 BURAS, Edmund M., Jr.

A COLD-SOLVENT EXTRACTOR. Textile Res. Jour. 21(6): 433-434. 1951.

A compact, leak-proof modification of the Soxhlet extractor, which allows attention-free extraction with the solvent at room temperature or somewhat below, is described.

- 5 FORE, Sara P., Moore, R. N., and Bickford, W. G.

IMPROVED PROCEDURE FOR CLEANING GLASSWARE USED IN DETERMINING THE STABILITY OF FATS AND OILS BY THE ACTIVE OXYGEN METHOD. Amer. Oil Chem. Soc. Jour. 28(2): 73-74. 1951.

A method is described for cleaning the glassware required in using the active oxygen method for determining the stability of fats and oils. The method which uses a synthetic detergent instead of hot or cold chromic-sulfuric acid leads to improved reproducibility of the determinations. The method described has given reliable results in use by the authors almost daily for more than a year.

- 6 LEWIS, Walter S.

ON PRECONDITIONING COTTON YARN AND TIRE CORD BEFORE TESTING BREAKING STRENGTH AND ELONGATION-AT-BREAK. Textile Res. Jour. 21(4): 256-258. 1951.

Tests were made to learn to what degree breaking strength and elongation-at-break of cotton yarns and tire cord are influenced by prior moisture history, and whether or not preconditioning before exposure to the standard atmosphere of 65 ± 2 percent r.h. at $70^\circ \pm 2^\circ$ F. should be required. Preconditioned cotton yarns and tire cord showed no significant

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differences in breaking strength or elongation-at-break that could be attributed to their moisture regain before their exposure in the standard atmosphere. The preconditions were approximately 29 percent r.h. at 96° F., 60 percent r.h. at 78°, and 80 percent at 70°. It is concluded that for such materials under the usual test conditions, where moisture regain is within the 4 to 10 percent observed in the samples tested, preconditioning so that moisture equilibrium in the standard atmosphere is approached from a lower regain is not necessary before determining breaking strength and elongation-at-break.

7 PETTIT, George A.

PRECISION PICKER KNOCK-OFF DEVELOPED AT SRRL. Textile World 101(2): 153. 1951.

A precision knock-off motion for attachment to a conventional cotton textile picker is described. The attachment has been in operation for more than a year and has proved a worthwhile development for research laboratories and other organizations which must prepare picker laps of any specified lengths from 4 to 40 yards.

8 PONS, Walter A., Jr., Hoffpauir, Carroll L., and O'Connor, Robert T.

DETERMINATION OF TOTAL GOSSYPOL PIGMENTS IN COTTONSEED OILS. Amer. Oil Chem. Soc. Jour. 28(1): 8-12. 1951.

A method is proposed for the application of the p-anisidine-gossypol reaction to the analysis of cottonseed oils for total gossypol pigments. The oil is dissolved in a hexane-isopropanol solvent and gossypol pigments are determined in an aliquot of the solution by means of the color developed with p-anisidine. The effect of the solvent and of the oil concentration on the color developed in the method has been investigated. The stability of gossypol in the solvent employed has been demonstrated, and data are presented on the recovery of gossypol added to cottonseed oils. Further spectrophotometric evidence indicated that a number of gossypol-like pigments are present in the crude oils and that they react with p-anisidine to give reaction products spectrophotometrically identical with that obtained for pure gossypol with the same reagent.

9 RUSCA, Ralph A.

THE SRRL-TYPE COTTON OPENER. Textile Indus. 115(5): 107-111. 1951.

The wide adoption of machine picking, which produces cottons of higher

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trash content, as well as the normal supply of low grade, hand-picked cottons, emphasizes the need for new and improved methods of cleaning at textile mills. A machine for opening and fluffing up cotton to enable better cleaning by equipment already in the mills has been developed. The opener has been evolved from the feeder of cotton-cutting equipment designed by the Southern Laboratory during the war to permit the use of lint cotton in manufacturing gunpowder. Experimental results on commercial cottons with the new opener indicate a worthwhile saving in spinnable fiber and the production of cleaner picker laps. It is recommended that the opener should be installed in the mills at the end of the feed table from the blending hopper feeders. The design principles, engineering features, and performance data of the new opener are presented in detail.

- 10 RUSCA, Ralph A., and Kyame, George J.,

AN EXPERIMENTAL, GAS-FIRED, INFRARED TEXTILE SLASHER. Textile Res. Jour. 21(6): 445-450. 1951.

An experimental, gas-fired, infrared textile slasher designed by the textile engineers of the Southern Regional Research Laboratory is described. The slasher processes warps 21 in. wide on beams with 18-in. heads, and is used in operations of pilot-plant scale. Among the features which represent departures from conventional methods of textile slashing are a new system for the preparation and distribution of the sizing material; a new and more flexible design of size box; an improved means for drying the size-impregnated warp, which combines the best features of radiant and convection drying methods; and a sensitive drive system capable of controlling the warp tension during processing.

- 11 SCOTT, Lorraino W., Barrett, Daniel J., and Rollins, Mary L.

THE ORIFICE TEST AS A METHOD FOR STUDYING CLOSING CAPACITY OF COTTON FIBER IN THE RAW STATE. Textile Res. Jour. 21(3): 148-155. 1951.

A modified orifice test is described which compares the closing capacities of cotton samples by measurement of the seepage of water under pressure through a bundle of parallelized fibers confined in the orifice. There is a good correlation between this orifice test on fibers and the original test on yarns which was described in a previous publication. Thus, the extensive process of yarn spinning may be unnecessary in a test for the prediction of the effectiveness of different cottons intended for use in products whose primary purpose is to resist penetration by water. The phenomenon of closing capacity is shown to be determined by the interplay of the effective amount of air space per unit weight of fiber in the orifice; the swelling of individual fibers; and the size and number of minute spaces between fibers.

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12 SKAU, Evald L.

SIMPLE EXPRESSIONS FOR THE CIRCULARITY AND FULLNESS OF FIBERS.
Textile Res. Jour. 21(1): 14-17. 1951.

The roundness of cotton and other fibers has an important influence on fiber maturity, luster, resilience, mercerization, suitability for mercerization, breaking strength, spinning and dyeing qualities, and other properties. A sound method of designating shape by means of a simple function which can be used as a numerical index has been needed. A simple expression, $\frac{4\pi A}{P^2}$, has now been derived mathematically for indicating the degree of circularity of fiber cross sections, A being the area and P the perimeter of the cross section. This index has been useful in investigations of the swelling of cotton in water and of the orifice test for closing capacity of cotton fibers. Similar functions have been derived to express the fullness and the deformability of fibers.

An analysis has been made of the error caused by deviations of the cutting plane from the plane normal to the fiber axis in calculating the circularity of idealized fibers from cross sections. The probable experimental error is negligible in circular fibers. In elliptical fibers with ratio of major to minor axis as large as 10, the error would be small and would tend to cancel out for a fiber bundle.

13 TRIPP, Verne W.

SOME IMPORTANT PROCEDURES IN ELECTRON MICROSCOPY. Address, Symposium on Electron Microscopy. March 1, 1951. Charity Hospital, New Orleans, Louisiana.

The procedures described for use of the electron microscope included methods of shadow casting of specimens with metal, the preparation of fibers by heating, and the use of replica techniques of preparing specimens.

See also nos. 16, 19, 21, 22, 23, 26.

No.

Cotton and Cotton Products

- 14 FYNN, P. J., Daly, Catherine N., Fleming, Constance M., and Dean, J. D.

CORRELATION STUDIES OF ACCELERATED AND NATURAL WEATHERING TESTS
OF PROTECTIVELY FINISHED COTTON DUCK. Textile Res. Jour.
21(2): 116-123. 1951.

Accelerated and natural weather exposure tests were made with unfinished and cotton duck samples and with samples treated with mineral pigments, film-forming resins, and vat dyes, alone and in combinations. The finishes were ranked in order of excellence on the basis of amounts of original strength retained by individual samples in both types of exposure. Although statistical interpretation of the data obtained in the two types of tests indicated a positive correlation between them, the relationship was not sufficiently constant to justify reliance on the employed accelerated techniques in predicting the behavior of finished cotton textiles in outdoor service conditions.

- 15 GOLDTHWAIT, Charles F.

REACTION OF FORMALDEHYDE WITH COTTON. Textile Res. Jour. 21(1):
55-62. 1951.

Partially methylenated cottons were prepared by the reaction of cotton with formaldehyde under acid conditions in nonaqueous (mainly acetone) solutions. The modified cotton, although it did not differ from ordinary cotton in appearance and general textile character, displayed new properties even at relatively low formaldehyde contents (from 0.5 percent to 1.5 percent), which may prove to be of practical importance. Dye-resisting yarns of possible technological interest can be produced apparently mainly owing to cross-bonding in the cellulose. The modified cotton has a decreased swelling capacity in water and other swelling agents. Products of sufficient formaldehyde contents have good resistance to biological rotting. Direct cotton dyes are made faster by the treatment.

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- 16 HONOLD, Edith, and Skau, Evald L.

PORE-SIZE DISTRIBUTION IN A SELECTED SERIES OF CLOSELY WOVEN FABRICS.
Textile Res. Jour. 21(6): 419-427. 1951.

The mercury-intrusion method for the determination of pore-size distribution was applied to 18 closely woven cotton fabrics, chosen to show the effect of maturity count, pickage, and processing (scouring and Zelan finishing). The apparatus used permitted a survey of practically the whole (96%) of the available void enclosed by the sample. The pressuring curves of the mature-cotton fabrics disclosed a rather distinct separation between the filling of the surface depressions and of the interfiber regions; the curves of the immature indicated a greater overlapping and blending of all regions. A comparison of the mature- and immature-cotton fabrics showed a shift in distribution toward smaller pore sizes in the immature. A similar trend to smaller pores was observed as the closeness of cloth weave was increased; this trend was further emphasized by a comparison of the fabric data with those obtained for the corresponding yarns. Processing resulted in a loss of total void volume included in the sample. The proportion of void volume within the interfiber pore sizes was increased at the expense of the volume within the surface depressions. A correlation between air permeability and the void volume of the interfiber range indicated that the interfiber pathways were the dominant factor in determining air permeability in these tightly woven fabrics.

- 17 McCALL, Elizabeth R. and Jurgens, Julian F.

CHEMICAL COMPOSITION OF COTTON. Textile Res. Jour. 21(1): 19-21.
1951.

The fiber properties of six samples of cotton are tabulated and chemical analysis reported for the following: cellulose, total and reducing sugars, nitrogen, wax, ash, ash alkalinity, pH of the water extract, water extractables, total organic acids, malic acid, citric acid, and pectic acid.

There is a rough correlation between the content of organic acids and the ash alkalinity and between ash and water extractables. Where the ash

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alkalinity exceeds the sum of the organic acids and pectic acid the pH of the water extract is high. Rain and other weathering factors, including molds, have a profound effect on the organic acid content. A complete chemical analysis of the ash from two of the cotton samples indicated that the major metal present is potassium. There are appreciable quantities of magnesium and calcium and smaller amounts of sodium, iron, and aluminum. Acid constituents included carbonate, sulfate, phosphate, chloride, and silicate.

Many investigators have reported values for the noncellulosic constituents, of raw cotton fiber, but very little attention has heretofore been given to the complete analysis of individual samples.

18 MEADOWS, Barkley

*TRENDS IN THE CONSUMPTION OF FIBERS IN THE UNITED STATES 1892-1948.

U. S. Dept. Agr. Statis. Bul. 89. 79 pp. 1950.

A statistical survey, covering 56 years of textile consumption in the United States, has been made which provides a convenient and comprehensive reference source on the competitive position and the relative importance of all the different fibers produced, processed, exported, imported, and consumed in the United States. The survey shows how the consumption of cotton and other textile fibers in the United States increases or decreases from year to year. Cotton is still used more than wool, silk, flax, rayon, and all other fibers combined. Rayon and other synthetic fibers reached all-time peaks during the past 5 years.

19 MORLIER, Cra W., Orr, Rollin S., and Grant, James N.

THE RELATION OF LENGTH TO OTHER PHYSICAL PROPERTIES OF COTTON FIBERS.

Textile Res. Jour. 21(1): 6-13. 1951.

The results of an investigation of the relation of tenacity of single fibers to fiber length are reported, and the instrument used in making the tests is described. Also described is a method for calculating a tenacity "index" for a cotton sample on the basis of single-fiber tests on only 3 length groups. The average breaking load and the average tenacity of single fibers increased with increasing fiber length within a sample. Within a sample, weight fineness (taken on the center part of

*Although published in 1950, this bulletin was not available until 1951.

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the fiber) reached a maximum for fibers the length of which is near the modal length. With increasing fiber length, elongation at break increased, ratio of elongation at break to breaking load decreased, and coefficients of variation for both breaking load and elongation at break decreased. The finer varieties exhibited the greater average stiffness, or ratio of tenacity to strain.

- 20 REEVES, Richard E., and Mazzeno, Laurence W., Jr.

THE HETEROGENEOUS HYDROLYSIS OF METHYL CELLULOSE. Textile Res. Jour. 21(3): 168-169. 1951.

It is pointed out that the published data of Steele and Pacsu on the rate of heterogeneous hydrolysis of methyl cellulose are in accord with the concept of a single reaction having an apparent activation energy of approximately 18 kilocalories per mol, the rate of which is primarily determined by the physical state of the substrate.

- 21 REEVES, Richard E.

CUPRAMMONIUM-GLYCOSIDE COMPLEXES. VI. THE D-MANNOSAN COMPLEX. Amer. Chem. Soc. Jour. 73(3): 957-959. 1951.

Complex formation between cuprammonium and D-mannosan produces a visible color change and increased absorption of light in the near ultraviolet, a shift in optical rotation, and a decrease in the conductance of a dilute cuprammonium solution. Measurements at equilibrium conditions by four techniques indicate a single stoichiometric reaction involving one molecule of D-mannosan and one of cuprammonium. This mechanism is shown to be considerably simpler than the one attributed to the reaction between cellulose and cuprammonium. The reaction constant for formation of the cuprammonium-D-mannosan complex is approximately 2.5×10^3 at 25° with the cuprammonium employed in the present work.

- REEVES, Richard E., Hoffpauir, Carroll L., and Demint, Robert J.

22

THE REACTION BETWEEN METHANOL AND HYDROGEN CHLORIDE AT 0° C. Textile Res. Jour. 21(2): 81-82. 1951.

Contrary to a report in the literature it is shown that the reaction between methanol and hydrogen chloride proceeds at an appreciable rate at 0°.

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- 23 REEVES, Richard E., Mazzeno, Laurence W., Jr., and Hoffpauir, Carroll L.

GLYCOSIDIC METHOXYL GROUPS IN METHANOLYZED CELLULOSE. Textile Res. Jour. 21(2): 78-81. 1951.

Oxidation by a glycol cleavage reagent has proved that the acid-labile methoxyl groups in methanolized cellulose are linked in glycosidic combination (one per molecule), and not in an acetal structure which would require two such groups per molecule. Evidence confirming the glycosidic structure was obtained by fractionating methanolized cellulose to the point where number-average molecular weights must be calculated upon the basis of one methoxyl group per molecule. The rate of removal of methoxyl groups from methanolized cellulose upon acid hydrolysis was roughly comparable to the rate of hydrolysis of methyl glucopyranosides. These findings contradict the basis for a claim, based on copper-number determinations, that the methoxyl groups of methanolized cellulose are very rapidly hydrolyzed and are of the acetal type.

- 24 REEVES, Richard E., and Jung, Julius R., Jr.

STABILIZATION OF NEUTRAL HYPOCHLORITE-OXIDIZED COTTON FIBER. Textile Res. Jour. 21(1): 22-25. 1951.

Cotton fiber oxidized by neutral hypochlorite solution, like cotton fiber oxidized by periodate, suffers two types of damage. One type is immediately evident; the other is latent damage which becomes evident after exposure of the oxidized fiber to aqueous alkali. But when fiber oxidized by neutral hypochlorite is treated with ethereal diazomethane before exposure to alkali a portion of the latent damage does not develop. The oxidized and treated fiber displays lower alkali solubility, lower cuprammonium fluidity and greater strength after exposure to alkali than does the fiber oxidized but not treated. Chlorous acid, found effective against the latent damage in periodate-oxidized cotton, is without effect against the latent damage in hypochlorite-oxidized cotton.

- 25 REID, J. David.

NEW COTTON FIBERS BY CHEMICAL MODIFICATION. Amer. Wool and Cotton Rptr. 65(19): 27, 29, 119-121. 1951.

Although cotton has many natural advantages, it has some deficiencies which prevent it from competing successfully with other natural or synthetic fibers in certain specific fields. By chemical modification of the cellulose, it is possible to alter greatly some properties of the cotton without alteration of its typical fibrous form. By chemical

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modification is meant the transformation of all or part of the cellulose into another chemical compound. For example, by esterification or etherification cotton is made water-repellent or more water-absorbent or rot-resistant or flame-resistant. These and other typical reaction treatments are discussed.

26 SEGAL, Leon, Nelson, Mary L., and Conrad, Carl M.

EXPERIMENTS ON THE REDUCTION OF THE CRYSTALLINITY OF COTTON CELLULOSE.
Jour. Phys. Colloid Chem. 55(3): 325-336. 1951.

A study has been made of the application of certain swelling agents to cotton cellulose and of their removal by nonaqueous liquids, with a view to reducing the crystallinity of the cellulose. The crystallinity of the resulting products has been estimated by the acid-hydrolysis residue method. Triton B was capable of lowering the crystallinity of cotton fiber progressively over its critical swelling range, but the result was accompanied by severe damage to the structure of the fiber. Treatment of cotton fibers with anhydrous primary alkylamines caused a reduction of crystallinity in varying degree, depending on the amine or mixture of amines used and other conditions employed. These amines did not appear to damage the structure of the fiber. The amine homologs above propylamine caused reduction of crystallinity after preliminary treatment with ethylamine. When an amine-treated cotton, from which the amine has been removed by means of a nonaqueous solvent, is dried and then immersed in boiling water for various periods up to 3 hr., the restoration of the original crystallinity is only slight. X-ray diffraction radial traces qualitatively confirm the conclusions drawn on the basis of crystallinity determinations made by the acid-hydrolysis residue method.

27 WARD, Kyle, Jr., and Reeves, Richard E.

HEAT OF CRYSTALLIZATION OF CELLULOSE. (Letter to the Editor.) Jour. Polymer Sci. 6(6): 778. 1951.

The calculations of heat of crystallization of cellulose by Calvet and Hermans (J. Polymer Sci., 6(1) 33-38 (1951)) have been shown to be dependent upon the presumption of equal heats of crystallization for Cellulose I (linters) and Cellulose II (rayon). It is recommended that a third sample of either modification, but with a different degree of crystallization, be used to check this presumption. Suggested materials are Cellulose I (cotton decrystallized with ethylamine) or Cellulose II (mercerized cotton).

See also nos. 1, 6, 7, 9, 10, 11, 12, 13.

No.

Cottonseed, Peanuts, Rice, and Other Oilseeds

28 ALTSCHUL, Aaron M.

CHEMICAL PROPERTIES AND NUTRITIVE VALUE OF COTTONSEED MEAL AS RELATED TO CONDITIONS OF PROCESSING. Natl. Cottonseed Products Assoc. Proc., Fifty-Fifth Ann. Conv., May 14-15, 1951, Palm Beach, Florida. Published in Cotton Gin and Oil Mill Press May 1951: 32-34, 36. 1951.

Research in cooperation with industry and nutrition investigators has shown that cottonseed meal is a variable nutritional material. The value of cottonseed meal as a feedstuff depends upon the type of animal being fed, the amine acid content of the component protein, the damage to the protein that has taken place during processing, and the presence of any associated materials which would interfere with growth and food utilization. Experimental meals have been prepared by the screw-press method which have been fed to hogs and chicks in varying quantities and have supported good growth. Conditions of cooking prior to removal of oil in the screw press greatly affect the protein value of the meal. Experimental screw-press meals have not caused egg yolk discoloration when fed to laying hens.

29 ARTHUR, Jett C., Jr.

UTILIZATION RESEARCH ON PEANUT MEAL AND PROTEIN AT THE SOUTHERN REGIONAL RESEARCH LABORATORY. Peanut Jour. and Nut World. 30(8): 21-22, 53. 1951.

Some of the published work of the Southern Regional Research Laboratory on new uses for peanut meal and protein is reviewed. The experimental developments discussed, which are the basis of 4 patents and 33 technical articles, include new nutritional uses for peanuts, manufacture of protein, preparation of fiber, and formulation of adhesives. It is pointed out that further development of these products will depend largely on the commercial availability of oil-free peanut meals containing soluble proteins.

30 BUDOWSKI*, Pierre

SESAME OIL. VII. OPTICAL ROTATION AND THE MINOR COMPONENTS OF SESAME OIL. Amer. Oil Chem. Soc. Jour. 28(2): 54-55. 1951.

The optical rotations of four crude sesame oils were calculated on the

*Rockefeller Foundation fellow of the Ministerio de Agricultura y Cria, Division de Quimica, El Valle, D. F. Venezuela.

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basis of their known contents of sesamin, sesamolin, and phytosterols and the reported optical activities for each of these components. The calculated optical rotations were compared with those observed for the oils in the absence of solvent, and were found to agree remarkably well. Sesamin, sesamolin, and phytosterol have been shown to be responsible for the observed optical rotations of several sesame oils and to account for 75 to 85% of the total unsaponifiable matter of these oils.

31 BUDOWSKI*, Pierre and Markley, K. S.

THE CHEMICAL AND PHYSIOLOGICAL PROPERTIES OF SESAME OIL. Chem. Rev. 48(1): 125-151. 1951.

In a comprehensive survey of the literature on sesame research throughout the world more than 250 articles are reviewed. The articles are grouped and discussed by subject matter in the following 7 categories: extraction and processing; composition; color reactions; minor constituents; stability; synergistic activity with pyrethrum insecticides; nutritional value and physiological properties. The greater part of the past literature on sesame oil has dealt with color tests and minor constituents; comparatively little has been reported in the other 5 categories listed.

32 DECOSSAS, Kenneth M., Deckbar, Frederick A., Jr., and Hecker, Joseph L.

VISCOSITIES OF COTTONSEED AND PEANUT OIL-HEXANE MISCELLAS IN ENGLISH UNITS. AIC-304. (Processed.) 1951.

Constant composition curves of viscosity versus temperature for refined and winterized cottonseed oil-commercial hexane miscellas and for like miscellas with peanut oil are presented. Tables of viscosities of these vegetable oil miscellas at various temperatures and compositions (2) were converted from data in metric units to English units and plotted as intermediate viscosity-composition isotherms. Readings of viscosity versus temperature taken off these intermediate curves were plotted. Absolute viscosity, η , as ordinate expressed in pounds per foot-hour, and temperature, t , as abscissa expressed in degrees Fahrenheit were plotted. These graphs are complementary to others in English units on boiling points, densities, and gravities of cottonseed and peanut oil miscellas. (See List for January-June 1950, item No. 12; and List for July-December 1950, item No. 25.)

*Rockefeller Foundation fellow of the Ministerio de Agricultura y Cria, Division de Quimica, El Valle, D. F. Venezuela.

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33 FREEMAN, Andrew F.

EDIBLE UTILIZATION RESEARCH ON PEANUTS. Address, National Peanut Council; Annual Convention, April 19-21, 1951. Palm Beach, Florida.

The objectives, facilities, and research program of the Southern Regional Research Laboratory, particularly with regard to research on peanuts, are briefly described. Effects of processing on the characteristics of peanut butters produced in the pilot plant at New Orleans are summarized. Also, preliminary results of an investigation to determine the effects of length of storage on peanut butter stored at about 80° F. are discussed. In this work the oils extracted from the peanut butters were analyzed by the active oxygen method, and the peanut butters were evaluated organoleptically. The work on the natural antioxidants of peanut oil, the thermal properties of this oil, and utilization in edible products is briefly reviewed.

34 GROS, Audrey T., and Fougo, R. O.

MODIFICATION OF VEGETABLE OILS. X. EFFECT OF MONOGLYCERIDES ON THE INTERFACIAL TENSION OF OIL-WATER SYSTEMS. Amer. Oil Chem. Soc. Jour. 28(1): 1-4. 1951.

Monoglycerides were prepared from oleic and linoleic acids and from each of the even-numbered, saturated acids from C₈ to C₁₈ by reaction of the pure acids with glycerol in the presence of an alkaline catalyst. The reaction products were purified to remove soaps, free fatty acids, and free glycerol, and to concentrate the monoglycerides. The interfacial tension of oil-water systems containing the concentrated monoglycerides were investigated. Observations were made of the effect of the length of the fatty acid chain in lowering the interfacial tension at a cottonseed oil-water interface at 70° C. using the monoglycerides of the saturated acids from C₈ to C₁₈. The quantities of monoglycerides required to reduce the interfacial tension to various values were determined. Measurements were made at 50°, 70°, and 90° C. to determine the effect of temperature on the lowering of interfacial tension. The effect of unsaturation on the surface activity of monoglycerides was evaluated by comparing the monoglycerides of stearic, oleic, and linoleic acids. Interfacial tension measurements were made using cottonseed oil, mineral oil, and amyl acetate, successively, as the oil phase to establish the effectiveness of glyceryl monostearate as a surface active agent with widely different types of oily materials.

35 HOGAN, Joseph T., and Arthur, Jett C., Jr.

PREPARATION AND UTILIZATION OF COTTONSEED MEAL GLUE FOR PLYWOOD. Amer. Oil Chem. Soc. Jour. 28(1): 20-23. 1951.

The preparation of plywood glues using hydraulic-pressed, screw-pressed,

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and hexane-extracted cottonseed meals is described; processing information is given for the preparation of plywood using the glue; and shear strengths of the glue joints are reported. Hexane-extracted cottonseed meal glue compared favorably with commercial casein glue and peanut meal glue, each glue mix and glue line being prepared as recommended to give maximum shear strengths. Values of shear strength and wood failure of glue joints containing hydraulic- and screw-pressed meals, as compared to hexane-extracted meal, were lower.

- 36 HOGAN, Joseph T., and Arthur, Jott C., Jr.

COTTONSEED AND PEANUT MEAL GLUES: PERMANENCE OF PLYWOOD GLUE JOINTS AS DETERMINED BY INTERIOR AND EXTERIOR ACCELERATED CYCLIC SERVICE TESTS. Amer. Oil Chem. Soc. Jour. 28(6): 272-274. 1951.

Data on the strength properties of cottonseed and peanut meal glues in plywood bonds as they are affected by accelerated interior and exterior cyclic service tests are reported. Cottonseed meal glue was superior to peanut meal glue and compared favorably with commercial casein glue on an interior test basis for 5 cycles. Cottonseed meal glue can probably be used for bonding plywood designed primarily for interior uses and for regions of comparatively low relative humidity. Cottonseed meal glue should be cheaper than casein glue on both a pound and glue line basis.

- 37 JENSEN*, Edith A., Lambou, M. G., Andrews, F. R., Mayo, R. Y., Karon, M. L., Curet, M. E., Wilcox,† F. B., Altschul, A. M., Newby,‡ Wales, and Bollens,§, Walter F.

THE STORAGE OF COTTONSEED. IX. BEHAVIOR OF COTTONSEED DURING STORAGE UNDER MILL CONDITIONS. Amer. Oil Chem. Soc. Jour. 28(6): 241-245. 1951.

In an investigation carried out with the cooperation of industry during the years of 1944 through 1950 on the behavior of cottonseed of various moisture contents during storage under mill conditions, it was learned that both the production of heat and the rate at which free fatty acids are formed are dependant not only on the initial moisture content, but also on the initial free fatty acids content. A reduction in moisture content by sustained aeration did not control the rapid rise in free fatty acids content; the oil content appeared to decrease during storage; and the refining loss appeared to be proportional to the quantity of free fatty acids in the crude oil. The data are tabulated and illustrated by graphs.

- 38 JENSEN*, Edith A., Lambou, M. G., and Altschul, A. M.

RESEARCH ON STORAGE OF COTTONSEED. Cotton Gin and Oil Mill Press. 52(4): 17, 14-15. Oil Mill Gazetteer. 55(8): 55-59. Cotton Digest 23(20): 18-19. 1951.

*Incumbent fellow, National Cottonseed Products Association. †Fellow of National Cottonseed Products Association for the period of January 1, 1948, to April 16, 1948. ‡Cotton Products Company, Inc., Opelousas, Louisiana. §Swift and Company Research Laboratories, Chicago, Illinois.

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The annual report of the fellow at the Southern Regional Research Laboratory of the National Cottonseed Products Association summarizes the year's progress in developing methods of improving the storage qualities of cottonseed. Mill-scale research conducted for several years in cooperation with industry was completed. Methods of handling were sought as complementary agents to chemical treatment to inhibit deterioration of stored seed. A method of heating cottonseed was developed and the effect of heat treatment was being investigated. The specific effect of fungicides on the spontaneous development of heat and the formation of free fatty acids in stored cottonseed was being studied. An evaluation of some of the experiments could not be made since the work was not completed and was continuing.

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JURGENS, Julian F., and Hoffpauir, Carroll L.

LIPIDE CONTENT OF RICE BRAN. Amer. Oil Chem. Soc. Jour. 28(1): 23-24. 1951.

The examination of rough rice of eight varieties grown in three locations each showed variations in milling yields and lipide contents of bran and of the true pericarp and bran fraction which are attributed to the influence of variety and environment of growth. The average values found on the moisture-free basis were 6.0% bran and 5.4% true pericarp and germ fraction for the rough rice and 19.5 and 21.8% lipides in the bran and the true pericarp and germ fraction, respectively.

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KNOEPFLER*, Nestor B., Graci, A. V., Jr., Spadaro, J. J., and Gastrock, E. A.

RESEARCH ON FRACTIONATION OF COTTONSEED MEATS. Cotton Gin and Oil Mill Press. 52(4): 16, 39-42. 1951. Oil Mill Gazetteer. 55(8): 66-71. 1951.

Progress in the development of a process of fractionation of cottonseed has been made during the past year and is reported. Advances were made in developing continuous pilot-plant unit operations to replace batch operations. Preparation factors affecting fractionation methods of obtaining greater reduction of gossypol were further investigated. Products from fractionation are being evaluated.

*Incumbent fellow, National Cottonseed Products Association.

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41 MARKLEY, K. S.

VEGETABLE OIL CROPS AS FOOD, FEED, AND INDUSTRIAL RAW MATERIALS.
Cotton Gin and Oil Mill Press. 52(11): 18-21, 47-53. 1951.

This article is a general review of world production and consumption of vegetable fats and oils, including source and types of oil-bearing materials, areas of production, yields per unit of area, oil and protein contents, and quality grades and uses. This information is given in greater detail for the principal oil crops: soybeans, cottonseed, peanut, corn, olives, coconut, oil palm, flax, tung, and castor seed, which together account for nearly 90% of all the vegetable oils of commerce. The average yield of all oil-bearing materials varies from 63% for copra to 16% for soybeans. The average yield of meal varies from 35% for copra to 80% for soybeans. The range of yields of oil per acre is from 2,500 lbs. to the acre for the African oil palm to 70 lbs. for cottonseed. In general, the higher the oil content of the seeds, the lower is the protein content, and vice versa. Oilseeds meals contribute a great deal of the feed for livestock and thus, indirectly, to fat supplies; and have uses also in food products and in several industrial products. Oilseeds are chemically very complex, their quality and condition being determined by variety, soil, weather during growth and ripening, cultural practices, and the treatment they receive after harvesting. It has, therefore, been necessary to establish quality grades that cover the whole range of probable variations. An example of the rapid technological advances that have been made in oilseed processing, especially since the war, is the present production of soybeans in the United States, which has been made possible to a very great extent by the development of improved methods of processing.

42 McCALL, Elizabeth R., Hoffpauir, Carroll L., and Skau*, Dorothy B.

THE CHEMICAL COMPOSITION OF RICE -- A LITERATURE REVIEW. AIC-312.
(Processed.) 1951.

The literature on the composition of rough, brown, and polished rice, rice bran, rice polish, and rice bran oil is summarized. Reliable information existing on the carbohydrates, nitrogenous constituents, vitamins, enzymes, phosphorus compounds, and inorganic constituents, and on the composition and properties of rice bran oil is reviewed. The review covers 251 references. A list of eleven general references is appended.

*Librarian, U. S. Department of Agriculture Library, New Orleans Branch.

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O'CONNOR, Robert T., Field, Elsie T., and Singleton, W. Sidney.

THE INFRARED SPECTRA OF SATURATED FATTY ACIDS WITH EVEN NUMBER OF CARBON ATOMS FROM CAPROIC, C_6 (HEXANOIC), TO STEARIC, C_{18} (OCTADECANOIC), AND OF THEIR METHYL AND ETHYL ESTERS. Amer. Oil Chem. Soc. Jour. 28(4): 154-160, 1951.

Before any appreciable application of infrared spectroscopy to vegetable oil research can be made, considerable data with reference curves on appropriate pure compounds will be required. This paper presents the infrared absorption data from 1 to 12 microns of the 13 straight-chain, saturated, monobasic fatty acids from caproic C_6 to stearic C_{18} and of their methyl and ethyl esters, all measured in chloroform solution against the chloroform solvent by mill-type readings. The complete curves are presented with the wavelength position of the maxima of the most prominent bands indicated. Band assignments correlating most of these bands to molecular structure have been made from information obtained from infrared literature. Intensity relationships throughout the homologous series have been computed for several of the bands, and the significance of the relationships obtained is pointed out. The data should be useful to future applications of infrared spectroscopy to vegetable oil research problems.

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PLANCK, Ralph W., Pack, Frank C., and Heinzolman, Dorothy C.

STABILITY OF ELEOSTEARIC ACIDS DURING STORAGE. Address, Amer. Tung Oil Assoc. Proc., Oct. 11-13, 1950, Biloxi, Mississippi*.

Alpha- and beta-eleostearic acids, prepared from tung oil, were stored under various conditions and the amounts of decomposition were determined by spectrophotometric examination. Exposure of alpha-eleostearic acid to the atmosphere at -4° to 35° C. caused the formation of sticky, viscous decomposition products only partially soluble in cyclohexane. Alpha-eleostearic acid was less stable than the beta isomer; since after 4 hours' exposure of thin layers of the two acids to the atmosphere in the dark at 35° only 0.8 percent of the original alpha form could be detected while 90 percent of the beta acid remained. Less decomposition was observed for samples of alpha-eleostearic acid stored under refrigeration in the presence of air. After 72 days of storage at -40° C., 96 percent of that eleostearic acid was unchanged while after 7 days at 4° C. only 17 percent remained. Alpha-eleostearic acid in evacuated ampules was found to be quite stable since 90-97 percent remained after 62-72 days at temperatures of -40° to 25° C. in the dark. The influence of diffused daylight and fluorescent light was negligible in producing deterioration in samples of dry alpha-eleostearic acid stored in air at room temperature; but under the same conditions the same light produced a slight acceleration of the

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decomposition of beta-oleostearic acid. Beta-oleostearic acid underwent decomposition to the extent of only 1 percent after exposure to the atmosphere for 6 days at 4° C. in the form of thin layers. Beta-oleostearic acid in the form of a paste made with ethanol was found to be more stable when stored in completely filled and tightly stoppered containers at 4 to 35° C. than when dry and exposed to the atmosphere at the same temperature. Refluxing of solutions of alpha-oleostearic acid in ethanol for periods up to one hour and of solutions of beta-oleostearic acid up to 23 hours caused no deterioration of the acids.

- 45 REUTHER, C. G., Jr., Westbrook, R. D., Hoffman, Wade H., Jr., Vix, H. L. E., and Gastrock, E. A.

SOLVENT EXTRACTION OF COTTONSEED AND PEANUT OILS. VIII. EFFECTS OF MOISTURE ON THE PREPARATION AND FLAKING OF COTTONSEED. Amer. Oil Chem. Soc. Jour. 28(4): 146-149. 1951.

The feed material is of primary importance in the preparation of cottonseed for solvent extraction. In this study the effect of moisture content of the delinted seed on the preparation of flakes having relatively few fines and allowing the ready percolation of solvent is investigated and evaluated. The work consisted of hulling, separating, and flaking in the pilot plant delinted seed of different moisture levels and then evaluating in the laboratory the flakes produced. The results indicate that 9 to 10% moisture in the meals is the best level for the preparation of flakes of the desired characteristics.

- 46 SHAHANI*, H. S., Dollear, F. G., Markley, K. S., and Quinby[†], J. R.

THE BUFFALO GOURD, A POTENTIAL OILSEED CROP OF THE SOUTHWESTERN DRYLANDS. Amer. Oil Chem. Soc. Jour. 28(3): 90-95. 1951.

The potential use of the seed of the Buffalo gourd, Cucurbita foetidissima, one of the wild gourds native to Southwestern United States and Northern Mexico, as a dryland oilseed crop was examined. The uncorticated seed contained 9.6% moisture, 31.7% protein, 26.5% crude fiber, 4.8% ash, and 24.3% extractable lipids (fat). After extraction with a hydrocarbon solvent the meal was found to contain 8.6% moisture, 42.0% protein, 35.2% crude fiber, 7.98% ash, and 0.36% residual lipids. The oil had an iodine value of 136.1, which places it in the semi-drying class along with, but slightly above, soybean oil; and had the following fatty acid composition,

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